Light and Lighting

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"We" and "They"

"IT'S wonderful the things *they* do nowadays . . . What will *they* expect *us* to do next? . . . *They* oughtn't to allow it . . . *We* mustn't complain . . ."

This subtle distinction between "we" and "they" is not unusual. It certainly implies an imperfection in partnership, an absence of common knowledge.

In the field of lighting we could do with less "we" and "they." Admittedly the user cannot be expected to share the full knowledge of the expert, but he should feel that the goal of both is the same and that lighting problems are solved by their common effort.

The illuminating engineer, on his side, rightly desires recognition as an expert and acknowledgment of the substantial help he has to offer.

But he should not imply the possession of an occult and secret knowledge available only to a privileged priesthood. He should be ready to share his knowledge—recognising that the more widely the nature and importance of good lighting is understood the higher the value set upon his services.

More I.E.S. Groups

The steady increase in the number of I.E.S. Centres and Groups has been largely responsible for the phenomenal increase in membership since 1939. Developments are still proceeding. One of the latest instances is afforded by the Western Area, where the coalition of Bath and Bristol Groups into a recognised Centre is being followed by efforts to form a group, allied to it, in Gloucester and Cheltenham. Anyone interested in this project is invited to get into touch with Mr. J. S. Freemantle (11, St. Aldate-street, Gloucester), who has already been successful in getting a considerable amount of support. Thus the Western Area, originally starting with rather slender support, promises to become quite a substantial one. In other areas, for example, the North Midland, where I.E.S. representation is powerful, other Groups may very likely be formed. The recently formed Stockton-on-Tees Group in the North-Eastern Area is gaining strength. A good field for future effort should be in the South-West, e.g., in the vicinity of Plymouth and Southampton, where Mr. J. E. Parker's recent paper on fluorescent lighting was very well received. Here, however, war conditions impose rather a serious obstacle to present progress. The same applies to the South-Eastern Area, in itself a peculiar one because of the absence of important cities and the fact that many of the chief towns are on the coast.

I.E.S.: Proposed Appointment of Secretary

The advertisement inviting applications for the post of Secretary of the I.E.S., which appeared in our last issue and is repeated in the present one (p. 105), is a natural outcome of the growth of the Society, the membership of which has nearly doubled since the outbreak of war. There are already nine Centres and five Groups in existence. Further additions are expected, and the Society has in prospect a programme of still greater activity and of new developments in the post-war period. In order to cope with these developments, the Council is now contemplating the appointment of a full-time paid Secretary, who, it is hoped, will eventually take full charge of its administration. In the meantime, however, the Council hopes to continue to benefit for some time to come from the services of its Honorary Secretary, Mr. J. S. Dow, who has been associated with the Society since its inception in 1909.

'Instant-Starting' Fluorescent Lamps

There is much speculation about the fluorescent lamps of the future. There will doubtless be quite a useful range in regard to size and candlepower, shape and colour. Of special interest is the possibility of diminishing the number of accessories, which add to the complexities of installation and are apt to prove rather unsightly. The announcement in the United States of a 40 w. fluorescent lamp which starts instantaneously is therefore timely. According to *Illuminating Engineering* (April, 1944, p. 235) limited numbers of the new lamp, which eliminates the need for starters and has the same rated life as the ordinary 40 w. lamp, became available on May 1. Circular fluorescent lamps and other new developments in size and shape have also been announced for manufacture as soon as war conditions permit.

Infra-Red Radiation

At the last meeting of the short winter session of the I.E.S. Huddersfield Group, on May 19, a talk on the above subject was given by Mr. I. Quigley. The system described by the lecturer is based on the use of tungsten filaments, run at high temperature within a glass envelope. The amount of visible energy present forms but a small percentage of the whole. Experience had shown that energy at a wavelength of 12,000 Angstrom units is, on the whole, the most efficient for the baking of paints; not only in respect of the actual transfer of heat to the stock, but also as regards actual penetration of energy through the surface of the paint. Mr. Quigley illustrated his lecture by lantern slides of actual installations of paint-baking apparatus and exhibited a 12-lamp assembly of 250 w. infra red lamps. There was a keen discussion, after which a vote of thanks to the lecturer, moved by Mr. E. Broadbent and seconded by Mr. R. Hardy, was carried with acclamation. Mr. J. T. Thornton, a member of the Committee, presided. It will be recalled that the Huddersfield Group is of quite recent development, having officially commenced activities on January 1, 1944. It has, however, already made good progress and has held five meetings, the average attendance (members and visitors) being about 40.

Easing Up of Sign Restrictions

A notable step during the past month has been the announcement that restrictions in regard to name-signs are to be relaxed. As usual, the conditions under which signs are permissible are not very clearly defined, though it is inferred that letters of dimensions less than 6 in. will in general be permitted. The news should be welcome to the sign industry though—as some members of the industry have pointed out—it is very much quicker to paint out a sign than to restore it!

A Handbook on Illumination

It appears that definite progress is being made by the committee of the American I.E.S. in connection with the proposed Handbook on Illumination. It is hoped shortly to make a report on the choice of an editor.

Lighting Problems in Great Britain

The American I.E.S. has for some time been showing keen interest in lighting developments in this country and, we understand, has now arranged for periodical notes from correspondents to appear in *Illuminating Engineering.* Meantime we notice in the April issue of that publication a letter from Mr. W. J. Jones in which wartime experience in Great Britain is very ably and concisely summarised. The chief points noted by Mr. Jones are naturally familiar to our readers—the attention devoted to factory lighting, fuel conservation and rules for shops, hotels and restaurants, "star lighting" in the streets, etc. One useful development has been the limitation of the varieties of lamps manufactured (more than 8,000 pre-war type or finishes being discarded). This is one wartime restriction which might well be pursued with advantage in time to come.

Lectures for Architects

We are interested to learn that a special series of lectures for architects has been arranged under the *aegis* of the I.E.S. Leicester Group and with the co-operation of the E.L.M.A. Lighting Service Bureau. Six lectures, during the period June 9 to July 14, have been given at the School of Architecture and Building (Leicester). Amongst the subjects are "Why an Architect Should Learn about Architectural Lighting," "Lighting Terms and Fundamentals," "Principles of Lighting Design," and "The Place of Lighting in Post-war Reconstruction as applied to Homes, Schools, and Offices."

Isocandles Simplified, or "Onions without Tears"

Dr. Walsh's classic contribution on the above subject, with its intriguing introduction from "The Hunting of the Snark" and its very lucid explanation of the isocandle diagram (or "onion"), appeared in *The Illuminating Engineer* quite a number of years ago. It has always been a useful source of reference for those making contact with these complexities, and it has been a matter for regret that copies of the journal containing the contribution have become almost unobtainable. We therefore gladly draw attention to the current issue of *Public Lighting* (April-June, 1944), in which Dr. Walsh's article has been reproduced by arrangement. I.E.S. members in need of guidance on this problem may be interested to hear that the contribution is again in print.

War-time Street Lighting in Australia

The questions raised in the House of Commons recently in regard to alleviation of the blackout are of interest. It may well be argued that the performances of pilotless bombs cannot be affected by the display of light. But it is apparently considered that even now the visits of hostile aircraft cannot be disregarded, and that therefore efforts to render observation difficult must continue. Mr. Morrison's not unsympathetic remarks did, however, seem to suggest that alleviation is not too distant. It seems likely to take the form of a more liberal street lighting rather than the relaxation of requirements in regard to screening of windows. Meantime public lighting engineers should, like the wise virgins, look to their lamps.

Meantime it is of interest to note experiences in Australia, as summarised in the *I.E.S. Lighting Review*. In December, 1941, street lighting was practically eliminated in Australia. The blackout, as here, proved irksome and dangerous, but was accepted as a necessary evil at that time. In July, 1943, restrictions were lifted, but in November, 1943, the Commonwealth Controller of Electricity, with the object of saving fuel, made a new order restricting street lighting to 100-watt lamps 200 ft. apart. Authorities in Sydney, Melbourne, and elsewhere protested, and apparently some concessions have been granted. Our contemporary remarks that reduction in street lighting as a measure to conserve coal is out of all proportion to the menace of unsafe streets by night.

Lighting of a Machine Shop

The photograph reproduced above shows a lighting installation recently carried out to a Benjamin specification in a machine shop in the north of England. The job presented certain complications in view of the large amount of overhead shafting along each of the side bays, the fixed and travelling cranes overhead, and the varying height of the roof. The installation was planned by the clever use of lamps varying in size from 200 watts up to 1,000 watts and mounted at heights ranging up to 24 ft. Benjamin Saaflux R.L.M. Reflectors are used throughout, and a very successful illumination is provided, averaging 20 ft.c., with good values on the machines themselves, where light is particularly needed. There are fittings down the outer sides of the shop which are not visible in the photograph.

Newcastle-on-Tyne: New Public Lighting Engineer

We note that, following the retirement of Mr. R. Davison, Mr. J. Grainger, who has been associated as inspector with the lighting department of Newcastle-on-Tyne, has now been appointed Lighting Superintendent.

Mr. Davison had held his position for many years, and was a familiar figure at A.P.L.E. gatherings.

The Scope of Lighting in Industry*

In a contribution which has appeared in *Sheet Metal Industries*, Dr. J. H. Nelson has recently given an excellent survey of the part played by lighting in industry.

"When a job can be seen clearly, easily, and comfortably, then, and only then, can it be done really well, and its efficacy depends upon the operator's eyes, the job, the lighting, and the decoration of the surroundings." In these words Dr. Nelson introduces his subject. He remarks that the idea is still too prevalent that lighting consists merely in providing the maximum number of foot-candles for the minimum power consumption. To refute this impression he quotes several recent papers, including Mr. Weston's analysis of the factors underlying the I.E.S. Code.

It must also be recognised that the eyes of the workers are no more mechanical than the workers themselves. The psychology of vision enters into the problem. A trained lighting specialist should be able to assess a problem quickly to conceive "what might be attained," a process difficult to develop in the experienced student and non-existent in the average layman.

Importance of Background

Dr. Nelson enumerates the familiar benefits of good lighting. He also devotes some consideration to the physical limitations of the eye, and Dr. Lythgoe's data in regard to the influence of brightness on acuity and the effect of the background—the latter a most important consideration not always appreciated. From the familiar diagram the inference is drawn that the best results are obtained with a surround brightness about half that of the object. The limits should be between one-tenth and twice the object-brightness. The illumination requisite in any case depends on the size of the object, its distance from the eye, and the difference between its reflection factor and that of its surroundings. There is, of course, often some difficulty in deciding what *is* the exact size with which one is concerned. Generally speaking, to approach the limit of performance requires at least 60 foot-candles, but many tasks can be made substantially easier by illuminations up to 1,000 foot-candles.

Lighting and "Rejects"

It is obvious that good lighting will diminish the number of "rejects." Yet the implications of this are not always understood. Supervisors not infrequently pick up a piece of work, take it to the window or light to examine it, and then return to point out the faults to the operator.

In both cases it is apparently overlooked that the faults discovered in the favourable conditions allowed to the supervisor and inspector just do not exist as far as the operator is concerned.

Apart from the admitted influence of good lighting in improving output in the case of difficult work, improvements often occur even when the job demands no great visual effort. It may be that the effort of working at relatively low illumination is in itself tiring; also gloomy surroundings in themselves tend to create depression and disinclination to work.

The recognition of colour is often important. In a well-lit shop the difference between brass, phosphor-bronze, and copper is evident, but in a dingy shop with dirty windows it may be necessary to look twice before one can be sure of a given piece of metal. The same applies to diagrams of wiring codes on which lines and symbols are executed in different colours.

Illumination and Speed of Vision

Good lighting also enables one to see *faster*. The observation of movement is really an act of deduction. The eye records a series of pictures, each differing from the previous one by a small amount, and it is thus understood that

* "The Scope of Lighting in Industry." By J. H. Nelson, Ph.D., A.R.C.S., A.Inst.P. (Joseph Lucas Research Laboratory). ("Sheet Metal Industries," January and February, 1944).

the object is moving. The ability of the eye to detect movement is closely associated with its power to detect rhythmic changes in brightness. It is thus allied to sensitiveness to flicker, which is often most evident when seen out of the corner of the eye. This emphasises the importance of bright surroundings and furnishes an additional reason for the use of light colours on walls and ceilings of workshops, and even on machines.

Avoidance of Fatigue

There is a great deal of difference between the minimum lighting just sufficient to perform a visual task and the amount to enable that task to be done with a minimum of effort. This is particularly true in the case of older workers. As an example mistakes in interpreting blue prints giving poor contrast are very common. If, however, these mistakes are due to poor lighting conditions they may be considered to be the fault of the management rather than the workman.

If the lighting is only the poorest tolerable any task becomes much more difficult than it need be, and operators become fatigued and suffer eye strain. Moreover, one should not judge the lighting in terms of mere momentary adequacy. The effect of working for hours in the lighting, and the adequacy of the lighting at the end of the day when operators are becoming fatigued, must be taken into account. Thus it is not possible for a factory manager to come in, fresh after a week-end, and judge how well the lighting will enable an operator to do a job after ten hours in the same lighting. Only those trained to do so can make such judgments.

Other Advantages of Good Lighting

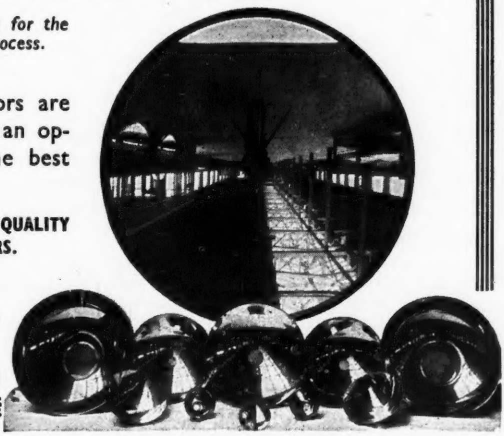
Good lighting is of considerable value in enabling the best use of floor space to be made. Dr. Nelson points out that if the general lighting system and the decoration of the workshop have been suitably designed then the general arrangement of the machines can be adopted simply to suit the particular production problem. It may be argued that some machines need special local lighting, but if this is the case the local light should be designed as an integral part of the machine. Otherwise the general lighting system should be adequate for all but the finest work. Good lighting also helps to promote cleanliness and order, improves labour conditions, and promotes safety. Orderliness is the result of continuous supervising effort. If the superintendent can see everything easily, and without having to peer into dark corners, the job of keeping order is much easier. Moreover, in gloomy surroundings it is not worth the trouble of keeping the place clean. The shop looks gloomy and dull in any case. In the U.S.A. it is stated to be difficult now to obtain labour unless good lighting conditions are available. The influence of working conditions on the type of labour employed is evident. The better class of labour goes to the better factory. Improved lighting is said to have resulted in a noticeable change for the better in the attitude of workers. [Thus in one factory the reduction in yard fights was stressed!]

It is one of the functions of a lighting system to draw attention to hazards. Therefore a good lighting installation will ensure safer conditions. This, however, is only one part of the picture. Often the hazard is seen too late to take avoiding action because the speed of vision, which we have seen to be related to the illumination, is too low. The existence of hazards is often brought out by the introduction of new labour. The old hands know where the danger spots are, but the new have to discover them for themselves.

Summarising, it is said that lighting affects the whole field of production. It is not engineering nor is it physics. Perhaps it might be called a branch of applied psychology.

Fundamental Factors

The remainder of the article deals with the requirements of good seeing. Most lighting engineers approach the problem from the point of view of an installation requiring so many foot-candles. But from the standpoint of



the person wishing to see the chief factors are:—

(a) The general "atmosphere" (brightness, colour, and variety of surroundings);

(b) The severity of the seeing task;

(c) The brightness and contrast of the object and the brightness and colour of the surrounding visual field.

These factors are interdependent. Not only the lighting but the decoration is involved in the satisfying of requirements. It is only logical for the lighting engineer to specify the decoration of space he is asked to light.

Local Lighting.

Reverting to the question of local lighting, Dr. Nelson repeats that the local light belonging to a machine should be as much part of that machine as the cutting tool. As a very good instance he describes the special lighting device contrived to assist the undercutting of mica separators between the segments of a commutator. The device, which has previously been described in this journal,* consists of a 12-V. 36-W. lamp lighting a small opal glass panel, which is reflected in the surface of the commutator and permits the attainment of a brightness of 1,000 equivalent foot-candles.

Light from the panel also falls on cream-tinted side panels and on a panel behind the commutator, forming an excellent background. Cases in which requirements can thus be met in an almost ideal manner by some special device do not often occur, but they illustrate the method that should be used whenever possible.

Use of Polarised Light

Several other special devices are described, one of the most interesting being the lighting up of synthetic sapphires by polarised light. The jewels rest on a plate of clear glass backed by a sheet of polarising material and opal glass. The jewel is thus examined by plane polarised light and, as it is itself doubly reflecting, it will change the state of the transmitted light. If now the jewel and its supporting table are viewed through a further polarising sheet, set so that the light from the first is extinguished, the jewel will show up in sharp contrast with its surroundings and imperfections are far more easily detected.

It must always be remembered that it is *the subjective brightness* that is important. It is not unusual to hear of complaints of excessive local brightness. A reduction in the power of the light source apparently gives some relief and lends strength to the argument, yet in fact the correct solution would have been to give more light to the darker parts of the visual field.

"Three Dimensional Painting"

The importance of having a field of vision larger than the mere article to be seen is well recognised—the most familiar example being the light border which the artist has always used to surround his work. In everyday life, however, a background much brighter than the object is not advantageous, as Lythgoe's work has shown. Neutral grey or aluminium finish has been suggested, but is apt to prove monotonous. Brainerd has found that the best finishes for machine tools are light buff and pale green (ref. factor 68 per cent.). To illustrate the effect Dr. Nelson shows the general effect in several "before and after" photographs of workshops. He suggests, however, that the full effect can only be judged by binocular vision, and, therefore, in the original article, he furnishes stereoscopic pictures. This insistence on the need for a stereoscopic view, involving the element of perspective, seems in line with the description "three dimensional painting" that has been applied to these processes.

A Congenial Atmosphere

In conclusion, the author again emphasises the need for providing a congenial atmosphere. In this connection he refers to the analysis of Dr. Luckiesh, who stresses the desirability of providing *variety without distraction*. The author, however, seems to consider that the nature of the background may with advantage be varied according to the task and according to the psychological outlook which it is desired to evoke.

* "Light and Lighting," March 1944, p. 32.

The I.E.S. and What it Stands For

In view of the great influx of members which the I.E.S. has recently received, occasional addresses reviewing its past history and presenting some account of its aims and objects are timely. A useful talk of this description was recently given to the Derby Group by Mr. Howard Long, who deputised for the President.

After sketching the Society's history since its formation in 1909, Mr. Long summarised more recent events, dwelling on the recent growth of membership and the development of Centres and Groups, more especially in the Midland Area. In this connection Mr. Long made a useful reference to the constitution of the Society, and its Articles and Bylaws, explaining the nature of its membership and how the Council is formed and elected—points with which new members are naturally not always familiar. He dealt also with the Society's aims and objects, explaining what its "cultural" organisation is intended to convey, and stressing particularly its interest to all sections of the community and its close relations with many other bodies. This he demonstrated by blackboard diagrams and also by the help of the symbolic drawing put out some years before the war, a species of "celestial chart" of light-giving bodies, with the I.E.S. at the centre surrounded by other associated "heavenly bodies," some larger than itself, but all shedding light in some degree, with the general public as the Milky Way.

This led to some account of illuminating engineering societies in other countries and the international organisation, the International Commission on Illumination and its national satellites, which functioned so well in pre-war days, conditions which we all hope will ultimately be restored.

I.E.S. in Australia: Federal Constitution

The relations between the three Illuminating Engineering societies in Australia (Victoria, New South Wales, and South Australia) are evidently shaping well. According to the "I.E.S. Lighting Review," representatives of the three bodies recently met in Sydney, where a useful analysis of federal constitution was made and many other matters of common interest, such as home lighting, co-operation with Government Departments, codes and publications, international development, publicity, and overseas liaison were discussed.

New I.E.S. Group in Gloucester and Cheltenham

We refer elsewhere (p. 98) to the prospect of a new I.E.S. Group being formed in the Western Area. We hear that good progress is being made, and that the formation of this Group in Gloucester and Cheltenham is being actively pursued, though it may take some little time before the formalities are concluded. At a meeting held on July 6 at the offices of the Gloucester Gas Light Company, the idea was sympathetically received. Both gas and electrical interests were well represented. An organising committee was formed, with Mr. A. L. Morris, general manager of the Gloucester and Cheltenham Gas Companies, as chairman, and Mr. J. S. Freemantle as honorary secretary. The Group will operate under the aegis of the Bath and Bristol Centre, several of whose leading members were present to give their support at the meeting referred to above. We understand that a good nucleus of membership has been already secured and that plans for a series of meetings in the autumn are being made.

The Munsell Colour Atlas

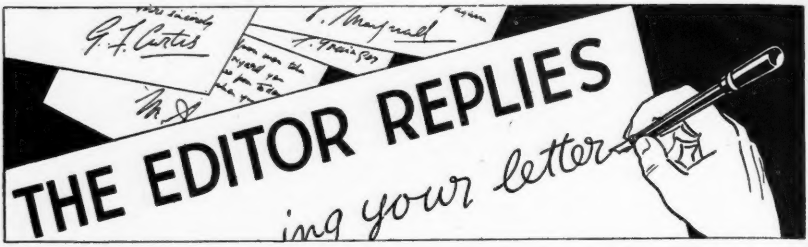
From time to time and for various specific purposes, sets of colours in the form of painted or printed samples have been prepared for the purpose of enabling the colours of objects to be described on a recognised system. One of the earliest of these was the "Répertoire des Couleurs," prepared in 1905 by the Société Française des Chrysanthémistes. The best known of such atlases are, probably, the Ostwald "Farbenatlas" and the Munsell "Book of Colour."

At the meeting of the Colour Group held at the Royal Society of Arts on June 7, Dr. W. D. Wright gave a very interesting address on the Munsell Atlas. He first pointed out that there was a definite need for such a system, in addition to the more orthodox methods of colorimetry, although it necessarily suffered from a number of disadvantages. In the first place, the total number of visually distinguishable colours was very large indeed, probably of the order of two million, taking into account differences of "value" (or brightness) as well as differences of hue and saturation. Inevitably, therefore, there were large gaps in any atlas of material samples. Further, there was the very important matter of the permanence of the samples. The possibility of change made it of vital importance that the colours of the samples should be known in terms of the C.I.E. system.

It was an essential of a good atlas that the colours should be arranged in a logical sequence and that the spacing should be reasonably uniform. The Munsell book was arranged as a succession of horizontal sections of a colour solid in which white was at the top and black at the bottom, hues around the periphery and saturation increasing radially outward from the vertical axis; each section therefore had a constant "value." A committee of the Optical Society of America had recently been working on the spacing of the Munsell colours. The samples in the Atlas had been measured spectrophotometrically and the C.I.E. coefficients had then been calculated. The results, plotted on a chromaticity chart, showed certain irregularities, and the committee had smoothed these and hence derived a table of "ideal" coefficients for the samples. The complete atlas would contain samples which differed in "value" by units on a scale of 10, in chroma (or saturation) by intervals of two units, again on a scale of ten, while as regards hue the scale contained ten units in each of ten colours (red, orange, yellow, etc.). The notation was in the form of a series of numbers; thus 7R5/4 represented a sample of which the hue was seven on the scale of red, five was the value (or brightness) and four was the chroma or saturation. Dr. Wright pointed out that constant hue did not necessarily imply constant dominant wavelength, as it had been found that for a given hue the dominant wavelength altered as the saturation was changed.

The lecture was followed by an interesting discussion in the course of which it was elicited that the "value" scale used by Munsell was logarithmic, not by intention but by a fortunate accident. There seemed to be no information available with regard to the way in which the samples were prepared.

(*Note: The spectrophotometric data on the samples and the recommendations of the O.S.A. committee regarding an ideally spaced system will be found in two papers published in the journal of the Optical Society of America for July*, 1943.)



I have been asked, " Will **the filament lamp** become completely **obsolete** in the future?" The answer evidently depends on the precise future period visualised. In the immediate post-war period there will doubtles be plenty of lighting done with filament lamps. Even thereafter one cannot imagine their being entirely discarded. The great range of candlepower available is an asset, and their high brightness, while often inconvenient for ordinary purposes of illumination, is just what we do want—and what the fluorescent lamp does not supply—when a relatively concentrated beam, e.g., a "spot-light," is desired.

Nevertheless, there will no doubt be a strong trend towards the use of sources of light (or lighting equipment) of **low brightness and extensive area** which will become available in a considerable range of candlepower and in great variety of colour. This will probably react on our standards of lighting, both as regards intensity and glare.

Higher values of illumination will become usual. Lighting experts may also more readily accept the dictum that the **brightness** of all light sources—unless very far removed from the range of vision—should not exceed that of the white sky, say, **2-3 candles per square inch.** In illuminating engineering, as in other fields, there is always a tendency to adjust our rules to suit our equipment. The use of filament lamps has led those concerned with the framing of rules to avoid glare to follow the line of least resistance; that is to say, sources or fittings which are really unduly bright in comparison with their surroundings are tolerated provided they are not in the direct line of vision.

This, however, is only a partial remedy. There is a lot to be said for the simple rules suggested as an ideal in the very early stages of illuminating engineering, namely, that (a) the brightness of sources of light (or fittings utilising them) should not exceed the average brightness of the white sky (or the candle flame), and/or (b) **the contrast** between their brightness and that of objects illuminated should not exceed about **100 to 1.** The latter rule would give a graded scale in regard to brightness of sources, according to the illumination provided.

Is it possible, for a given expenditure of energy, to obtain a **greater brightness** from a **fluorescent surface** excited by ultra-violet energy than by illuminating an ordinary surface with visible white light? This is the sort of question of which one needs to " have notice." The answer must depend in some degree on the nature of the surface illuminated. If, for example, we are thinking of a picture, in the one case painted in fluorescent materials and in the other executed in pigments, the nature of the subject and the reflection factor of the paint used would make a difference.

Regarding the subject broadly, I think it may be fairly said that the brightness achieved by means of **fluorescence cannot compete** with that resulting from the use of white light from the most efficient

illuminants available. This is roughly confirmed by the experiment shown at the recent E.L.M.A. luncheon; to secure an effect from U.V. radiation, falling on fluorescent walls and ceiling, equivalent to that resulting from the use of fluorescent tubular lamps in a room of similar dimensions required considerably more energy.*

In a proper comparison it should be assumed not only that the same energy is available, but also that the sources are equidistant from the surface to be treated, as one needs to do in dealing with a surface of any considerable area. It may, however, happen that in certain devices, e.g., luminous signs or relatively small emblems or decorations, a small source of U.V. radiation can be brought into close juxtaposition with the object, giving enhanced brightness. (In the case of self-luminous radio-active paint the excitant and the fluorescing material are actually mixed.)

This question does not touch the main advantage of the use of fluorescent materials to produce pictorial effects—**the outstanding contrast** with the background, which gives such singular "life" to the picture, especially when shiny materials such as metal are simulated. For this reason, and also because of the great range of colour now available, one may confidently expect this process to play a great part in pictorial display in the future.

* "Light and Lighting," May, 1944, p. 78.

A **question of style.** Can one approve the prevailing tendency to adopt **capitals** for the first letter of words one deserves to emphasise? In the case of titles of articles it is usual, and perhaps also in captions under illustrations. I do not think the practice should be adopted in the text. In German all nouns commence with a capital—a rather convenient usage for the foreigner. In English this practice is ordinarily confined to names and to the Deity. Enthusiasts are now rather prone to give the Illuminating Engineer and Illuminating Engineering a similar distinction, and even to bestow it on such items as Lamps, Fittings, Economy, Efficiency, Production, and Psychology (the choice depending on their mental bias), even when the term appears in the middle of a sentence. (In these columns I habitually secure emphasis by the use of Doric type—though I, too, may inadvertently slip into capitals occasionally.)

The question whether the time is not ripe for the **alleviation of the blackout** is dealt with elsewhere (see p. 101). There is force in the contention that the flying bombs have no power of observation, so that, so far as they are concerned, a blackout is useless. There are, however, doubtless other considerations, and I do not feel that I can make any useful addition to the remarks of Mr. Morrison.

Machine Shop Lighting

The accompanying illustration shows a section of a machine shop in a factory engaged in important work. The new installation consists of Philips "Philora" MB/V 125-volt mercury lamps placed at 12-ft. 6-in. centres, and has resulted in an increase in the illumination to 15-18 ft.c. The new lighting scheme is stated to have played an essential part in achieving and holding a high rate of output.

Fluorescent Street Lighting

There has been much conjecture in regard to the possibilities of fluorescent lamps for street lighting. A note on this subject by Mr. Kirk M. Reid in "Illuminating Engineering" (May, 1944, p. 311) is, therefore, of interest.

It is reported that extensive tests on various types of discharge lamps have been made at Nela Park under outdoor conditions, and several designs of fluorescent lamp luminaires have been tried out. It is inferred that fluorescent lamps have some advantages for street lighting, but also some disadvantages. The advantages include high efficiency, low brightness, relatively long life, and enhanced visibility on wet pavements, owing to broad streaks of brightness from an elongated source. The disadvantages include inherently low light output per foot of source, large size of fittings, and the necessity of jacketing in cold weather.

These factors are analysed in detail. The advantage of securing broad streaks of brightness on wet pavements when lamps are mounted across the street is offset by the drawback of large dimensions. The relatively large diameter of the tubes (as compared with filament sources) prevents redirection of adequate flux to the street surface between lamps, unless lamps are spaced much closer than in present practice or a very large and unsightly optical system is contrived. The effect is therefore spotty. In practice the low brightness is not such an outstanding advantage for street lighting, since, at the distance at which lamps are viewed, glare depends mainly on candle-power rather than brightness.

In order to obtain the requisite candle-power, large lengths of tube or great numbers of lamps would be needed, making an unsightly effect. The larger size of the lamps would also result in greater cost of installation; special designs of maintenance trucks would be required to transport the tubes and their jackets. Periodic group replacement would be expedient.

On the whole, it is concluded that, in terms of visibility per dollar of total light costs, these lamps would be at a disadvantage for ordinary street lighting This judgment applies mainly to roadways on which traffic considerations are paramount—i.e., the largest milage of street lighting. In city streets, and especially in shopping and entertainment centres, the decorative qualities of the lamps and the range of colour available may influence practice. Merchants may, for example, adopt them for local parade lighting.

[One would imagine that they would also find applications for lighting the entrances and frontages of buildings, courtyards, etc. In such cases they might be attached to the façades of buildings, a more convenient arrangement than attaching them to standards, as in street lighting proper.]

Searchlights Determine Altitude of Clouds

According to *Illuminating Engineering* a five-mile beam of light from a 16-in. searchlight is proving very helpful in determining the altitude of clouds anywhere from zero ceiling up to 28,000 ft. By observation of the round spot formed by the beam, which is directed vertically upwards, the height of the cloud on which it impinges can be determined in a few seconds.

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